APPENDIX E

RESULTS OF RESIDENTIAL ACTIVITY SURVEYS

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E-1. BARBECUES

Barbecuing is characterized as a leisure activity; therefore, the expectation is that barbecues occur much more frequently on the weekend as opposed to on weekdays in residential areas. As shown in **Table E-1**, 48% of barbecuing, and, therefore emissions, occur on the weekend, and 73% of all barbecuing occurs in the evening.

Table E-1. Barbecue activity by day of week and time of day (morning, afternoon, evening).

DAY OF WEEK	% OF WEEKLY ACTIVITY	% MORNING	% AFTERNOON	% EVENING
M	11%	-	10%	90%
T	6%	20%	-	80%
W	16%	7%	7%	86%
Th	9%	11%	22%	67%
F	10%	-	12%	88%
S	25%	7%	39%	54%
S	23%	7%	48%	45%
-	Average	7%	20%	73%

The variation in barbecue activity by neighborhood (see **Table E-2**) shows that barbecuing is an activity that can vary greatly by location within the SoCAB. For example, respondents near the Pico Rivera site use barbecues 40% more often than respondents near the Azusa site. The time of day that barbecues occur is also different. Azusa and Industrial Hills show one type of pattern in which roughly 20% of barbecues occur in the afternoon and 80% in the evening. Conversely, Los Angeles N. Main and Pico Rivera show a pattern in which barbecues occur slightly more often in the afternoon (47%) as opposed to the evening (41%). Los Angeles N. Main and Pico Rivera also show significant levels of barbecuing in the morning.

Table E-2. Barbecue activity by location and by time-of-day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	5.2%	-	19%	81%
Industrial Hills	7.7%	2%	20%	78%
Los Angeles N. Main	6.1%	12%	48%	40%
Pico Rivera	8.3%	14%	46%	41%

E-2. CONSUMER PRODUCTS

Consumer products include hair sprays, dyes, nail polishes, polish removers, etc. As shown in **Table E-3**, residents report using consumer products fairly uniformly throughout the week. There is a slightly higher use on Friday (17%) compared to the daily average and slightly

less use on Sunday (12%). Consumer products are most often used in the morning (70%), and less often in the afternoon (14%) and evening (16%).

Table E-3. Use of consumer products by day-of-week and time-of-day.

DAY OF WEEK	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
M	15%	76%	11%	13%
T	14%	74%	11%	15%
W	15%	68%	16%	17%
Th	14%	70%	12%	17%
F	17%	66%	15%	19%
S	14%	68%	18%	15%
S	12%	71%	15%	14%
-	Average	70%	14%	16%

As shown in **Table E-4**, Industrial Hills residential respondents use consumer products 70% more than residential respondents in Pico Rivera. The time of day that consumer products are used varies by location. For example, Pico Rivera residents report no use in the evening. Conversely, Los Angeles N. Main residents report 21% of consumer product use is in the evening.

Table E-4. Consumer product activity by zone by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	32%	78%	6%	16%
Industrial Hills	39%	68%	17%	15%
Los Angeles N. Main	31%	57%	22%	21%
Pico Rivera	23%	82%	18%	-

E-3. ENGINE OILS

Residential use of engine oils includes motor oils, gear oils or fluids, or brake fluids is shown in **Table E-5**. Engine oils are used about twice as often on Wednesday (26%) and Saturday (20%) than the rest of the week. Engine oils are most often used in the morning (36%) and afternoon (41%) and less often in the evening (23%).

Table E-5. Use of engine oils by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
M	10%	0%	50%	50%
T	12%	40%	20%	40%
W	26%	45%	36%	18%
Th	12%	40%	60%	0%
F	10%	40%	40%	20%
S	20%	50%	39%	11%
S	11%	33%	44%	22%
-	Average	36%	41%	23%

The variation in engine oil activity by location (**Table E-6**) underscores the fact that residential activities can vary greatly by location within the SoCAB. As shown in Table E-6, Industrial Hills residents use engine oil three times more often than residents in other zones. The time of day that engine oil products are used also varies by location. For example, Pico Rivera residents report no use in the evening. Conversely, Los Angeles N. Main residents report 30% of engine oil use is in the evening.

Table E-6. Use of engine oil by location and by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	1.6%	36%	45%	18%
Industrial Hills	2.1%	42%	42%	17%
Los Angeles N. Main	6.4%	33%	37%	30%
Pico Rivera	2.1%	67%	33%	-

E-4. FIREPLACES

As shown in **Table E-7**, fireplaces are used more often on Wednesday (20%) and Saturday (23%). Fireplaces are least often used on Monday (7%) and Friday (7%). Fireplaces are most often used in the morning (52%). The results of the survey for fireplace use is particularly subject to a high degree of uncertainty because the survey period included an unusually rainy and cool period during the week with warmer days on the weekends.

Table E-7. Use of fireplace by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	7%	100%	-	-
T	13%	50%	50%	-
W	20%	33%	33%	33%
Th	13%	50%	-	50%
F	7%	67%	33%	-
S	23%	25%	13%	63%
S	17%	40%	20%	40%
-	Average	52%	21%	27%

As shown in **Table E-8**, residential respondents near the Los Angeles N. Main site use fireplaces 10 times more often than residents in Azusa. The time of day that fireplaces are used is also different by location. For example, Pico Rivera residents report no use in the evening while Los Angeles N. Main residents report 30% of fireplace use is in the evening.

Table E-8. Use of fireplace by zone by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	0.3%	36%	45%	18%
Industrial Hills	0.5%	42%	42%	17%
Los Angeles N. Main	3.2%	33%	37%	30%
Pico Rivera	1.0%	67%	33%	-

E-5. GASOLINE POWERED LAWN EQUIPMENT

As shown in **Table E-9**, gasoline-powered lawn equipment is used most often on Friday (20%) and Saturday (20%) and least often on Tuesday (8%). Gasoline-powered lawn equipment is most often used in the morning (49%) and afternoon (42%) and less often in the evening (8%).

Table E-9. Operation of gasoline powered equipment by day of week and time of day (morning, afternoon, evening).

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	14%	67%	25%	8%
T	8%	63%	38%	-
W	11%	56%	44%	-
Th	14%	25%	58%	17%
F	20%	40%	57%	3%
S	20%	44%	41%	15%
S	11%	50%	33%	17%
-	Average	49%	42%	8%

The use of gasoline-powered lawn equipment varies by location (see **Table E-10**). For example, Industrial Hills residents use lawn equipment twice as often as residents near Los Angeles N. Main and Pico Rivera. The time of day that lawn equipment is used is also somewhat different. For example, Azusa and Pico Rivera residents report 5% use in the evening. Conversely, Industrial Hills and Los Angeles N. Main residents report 15% use or three times as much use in the evening.

Table E-10. Use of gasoline-powered lawn equipment by location and by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	5.4%	53%	42%	5%
Industrial Hills	8.7%	37%	49%	14%
Los Angeles N. Main	4.2%	45%	40%	15%
Pico Rivera	4.9%	58%	37%	5%

E-6. PAINTS AND SOLVENTS

As shown in **Table E-11**, paints and solvents are applied slightly more often on Thursday (17%) and Saturday (16%) relative to the rest of the week (13%). Paints and solvents are most often applied in the morning (40%) and afternoon (47%) and less often in the evening (12%).

Table E-11. Application of paints and solvents by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	15%	30%	70%	0%
T	13%	78%	11%	11%
W	13%	42%	42%	17%
Th	17%	33%	47%	20%
F	13%	32%	47%	21%
S	16%	30%	57%	13%
S	13%	36%	59%	5%
-	Average	40%	47%	12%

As shown in **Table E-12**, Industrial Hills and Los Angeles N. Main residents apply paint and solvent almost three times more often than Azusa and Pico Rivera residents. The time of day that paints and solvents are applied is also different. For example, Azusa reports 62% use in the afternoon compared to 31% by Pico Rivera. Industrial Hills and Pico Rivera respondents report 22% and 19% of their activity occur in the evening as opposed to Los Angeles N. Main with no activity.

Table E-12. Application of paints and solvents by zone by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	2.3%	33%	62%	5%
Industrial Hills	6.2%	24%	54%	22%
Los Angeles N. Main	5.9%	54%	46%	-
Pico Rivera	2.1%	50%	31%	19%

E-7. PAVING MATERIALS (ASPHALT AND TAR)

As shown in **Table E-13**, there is some variation in the use of paving material by day of week. While the greatest activity occurred on Monday (19%), Thursday (19%), and Saturday (19%), this result is based on a small number of residents who reported using paving material. We do not have much confidence that this day-of-week pattern will be consistent with a larger dataset. Nevertheless, paving materials were most often applied in the morning (69%) and less often in the afternoon (20%) and evening (11%).

Table E-13. Use of paving material (asphalt and tar) by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	19%	100%	-	-
T	10%	100%	-	-
W	10%	100%	-	-
Th	19%	-	50%	50%
F	10%	100%	-	-
S	19%	50%	25%	25%
S	14%	33%	67%	-
-	Average	69%	20%	11%

As shown in **Table E-14**, Azusa and Industrial Hills residents applied paving materials six to seven times more often than Pico Rivera residents. The time of day that paving materials are applied is somewhat different, but the number of residential respondents who reported using paving materials is small.

Table E-14. Use of paving material by zone by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	2.9%	50%	50%	-
Industrial Hills	3.4%	-	100%	-
Los Angeles N. Main	2.0%	75%	12%	12%
Pico Rivera	0.5%	100%	-	-

E-8. PESTICIDE APPLICATIONS

As shown in **Table E-15**, pesticides and fertilizers are applied more often on Friday (22%) and Saturday (22%) and least often on Wednesday (3%). Pesticides and fertilizers are most often applied in the morning (37%) and evening (42%) and less often in the afternoon (21%).

Table E-15. Applications of pesticides and fertilizers by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	9%	33%	33%	33%
T	14%	40%	20%	40%
W	3%	-	-	100%
Th	14%	40%	20%	40%
F	22%	40%	13%	47%
S	16%	45%	18%	36%
S	22%	60%	40%	-
-	Average	37%	21%	42%

The variation in pesticides and fertilizers use by location is shown in **Table E-16**. Los Angeles N. Main residents apply pesticides and fertilizers five times more often than Pico Rivera residents. The time of day that pesticide and fertilizers are applied is also different. For example, Azusa respondents report 69% use in the morning compared to 0% by Pico Rivera respondents. Los Angeles N. Main and Pico Rivera respondents report 48% and 50% of their activity occur in the evening compared to Azusa respondents who report 8% activity in the evening.

Table E-16. Application of pesticides and fertilizers by location and by time of day.

MONITORING SITE	% OF RESIDENCES WITH THIS ACTIVITY DAILY	% MORNING	% AFTERNOON	% EVENING
Azusa	1.9%	69%	23%	8%
Industrial Hills	2.6%	47%	33%	20%
Los Angeles N. Main	5.1%	29%	24%	48%
Pico Rivera	1.0%	-	50%	50%

E-9. POURING DIESEL OR GASOLINE INTO OR OUT OF A CAN

As shown in **Table E-17**, the pouring of diesel or gasoline occurs more often on Thursday through Sunday (17%-21%) and least often on Monday through Wednesday (9%) and occurs more often in the morning (41%) and evening (41%) and much less often in the afternoon (11%).

Table E-17. Pouring diesel or gasoline into or out of a can by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	9%	50%	50%	-
T	9%	-	-	100%
W	9%	-	-	100%
Th	21%	40%	20%	40%
F	17%	78%	22%	-
S	19%	67%	11%	22%
S	17%	50%	25%	25%
-	Average	41%	18%	41%

As shown in **Table E-18**, Industrial Hills residents pour diesel or gasoline 60% more often than other sites. The time of day that this process occurs also varies. Pico Rivera residential respondents report this process occurring 100% in the morning compared to 17% by Los Angeles N. Main respondents. Los Angeles N. Main respondents report 83% of their activity occurs in the evening compared to Azusa and Pico Rivera respondents with no activity in the evening.

Table E-18. Pouring diesel or gasoline into or out of a can by zone by time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
Azusa	1.3%	60%	40%	-
Industrial Hills	2.6%	47%	27%	27%
Los Angeles N. Main	1.5%	17%	-	83%
Pico Rivera	1.6%	100%	-	-

E-10. MOTOR VEHICLES DRIVEN FROM RESIDENCE

As shown in **Table E-19**, motor vehicles are driven equally every day of the week. Motor vehicles are most often driven from residences in the morning (46%) followed by the afternoon (30%) and then the evening (24%).

Table E-19. Frequency of motor vehicles driven from residences by day of week and time of day.

DAY OF WEEK	% OF RESIDENCES BY DAY WITH THIS ACTIVITY	MORNING	AFTERNOON	EVENING
M	14%	50%	28%	22%
T	15%	48%	28%	23%
W	15%	48%	28%	24%
Th	14%	48%	27%	25%
F	15%	46%	31%	23%
S	14%	40%	35%	26%
S	13%	41%	35%	23%
-	Average	46%	30%	24%

E-11. WD-WE PEAK ACTIVITY TIMES

Table E-20 summarizes our finding as to the peak period(s) of each residential activity as reported in prior sections of this appendix. Both day of week (WD-WE) and time of day (morning, afternoon, and evening) that an activity was most engaged in by respondents is reported. Not surprisingly, Saturday appears as the most frequent day of activity. This was not unexpected as it is a day in which most adults are not working at a business. Morning is the time most mentioned as when an activity was most frequently engaged in.

Table E-20. Intercomparison of residential activity in terms of peak activity time.

ACTIVITY	DAY OF WEEK		TIME OF DAY	
	Peak Day	Peak Frequency	Peak Time	Peak Frequency
Barbecue	Sat, Su	23-25%	E	73%
Consumer products	None	-	M	70%
Engine oils	W, Sat	20-26%	M/A	36-41%
Fireplaces	W, Sat	20-23%	M	52%
Gasoline powered lawn equipment	F, Sat	20%	M/A	49-42%
Paints and solvents	None	-	M/A	40-47%
Paving materials	Th, Sat	19%	M	69%
Pesticides or fertilizers	F, Su	22%	M/E	37-42%
Pouring of diesel or gasoline	Th-Su	17-21%	M/E	41%
Vehicle traffic	None	-	N/A	N/A

M/A/E = Morning, Afternoon, Evening

E-12. UNCERTAINTY OF RESIDENTIAL RESPONSES

A strict approach was taken in determining whether a respondent took part in a particular activity each day. The approach taken was that the postcards received from respondents required a "yes" for an activity and the time of day (either morning, afternoon, and/or evening). There is a possibility that by taking this approach, this analysis understates the frequency of some residential activities. For example, the residential responses on postcards include those in which "yes" was checked for an activity but the time of day (morning, afternoon, evening) was not checked. Our approach assumes that the respondent inadvertently checked "yes" rather than "no" for the activity. To the extent the respondent correctly checked "yes" for the activity but forgot to indicate a time of day, this analysis undercounts the frequency of an activity by residence.

Postcards from Azusa respondents were most often found to show this unusual response of checking "yes" for an activity but not checking a time of day. The total number of such occurrences by activity was for a few activities higher than the number of Azusa respondents that checked "yes" for the activity and checked morning, afternoon, and/or evening for the time of occurrence. This means that for a few activities the percentage of residences engaged in that activity by day as reported for Azusa could be understated by as much as a factor of 2.

The residential survey data also includes postcards in which the respondent checked "no" for the activity but indicated a time of day (either morning, afternoon, or evening). To the extent the respondent incorrectly checked "no" and meant to check "yes", this analysis also undercounts the frequency of this activity by residence.

During the period September 29 to October 8, 2000, survey period, it rained on Wednesday, October 4 and Friday, October 6. Because it rained on Wednesday and the second Friday, the possibility exists that the survey results as to residential activity are affected by this phenomenon.

Because the response for consumer products on Wednesday (a rain day) is similar to that reported on Tuesday and Thursday, and the outcome on the second Friday is between that on Thursday and Saturday, there is no reason to believe that weather (rain) affected the outcome of the survey for consumer products. (See **Figure E-1**)

With regard to barbecues, engine oils, paints and solvents, and pesticide and fertilizer usage, the findings are as follows. We note that the number of positive responses is rather small (less than 15 for any given day), and so marginal changes in activity from day to day may explain the variations observed (see **Figure E-2**).

As shown in **Figure E-3**, the number of positive responses reported by day for fireplace, pouring diesel or gasoline (D/G), and paving are so small (7 or less) that attempting to identify whether weather (rain) affected the outcome of the survey results for these activities is not possible.

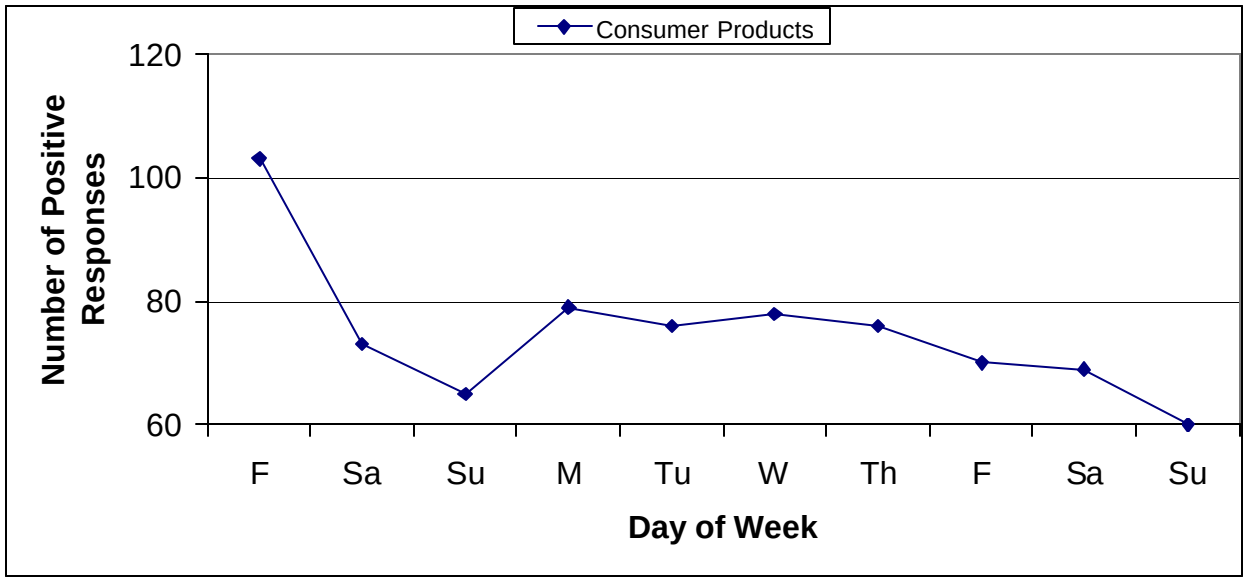


Figure E-1. Reported consumer product activity by day of week.

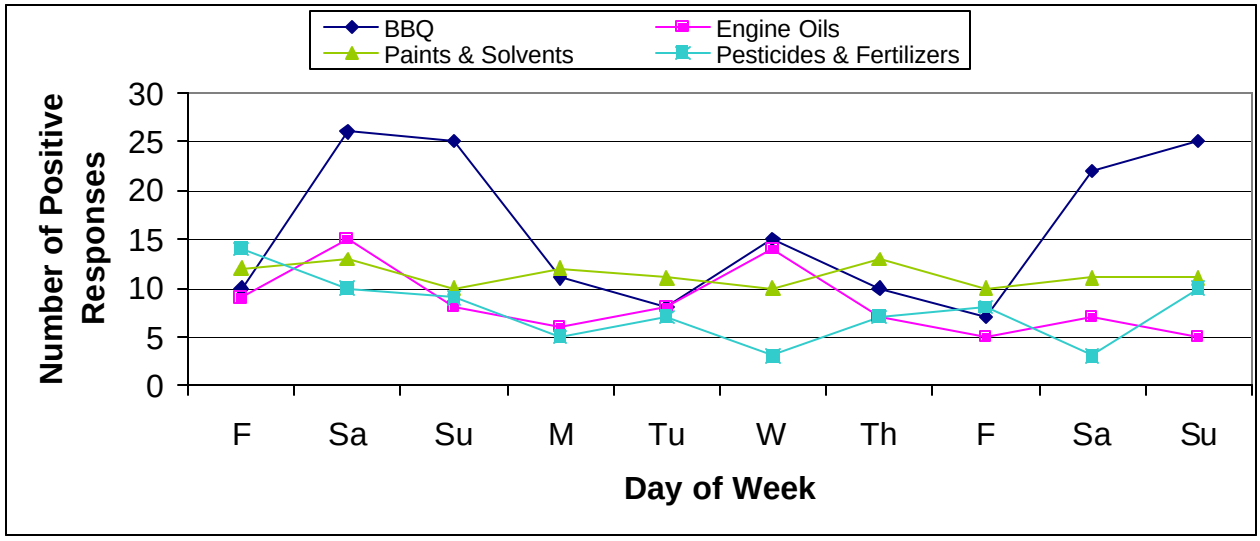


Figure E-2. Number of Respondents reported to be using the barbecue, engine oils, paints and solvents, and pesticides and fertilizers by day surveyed.

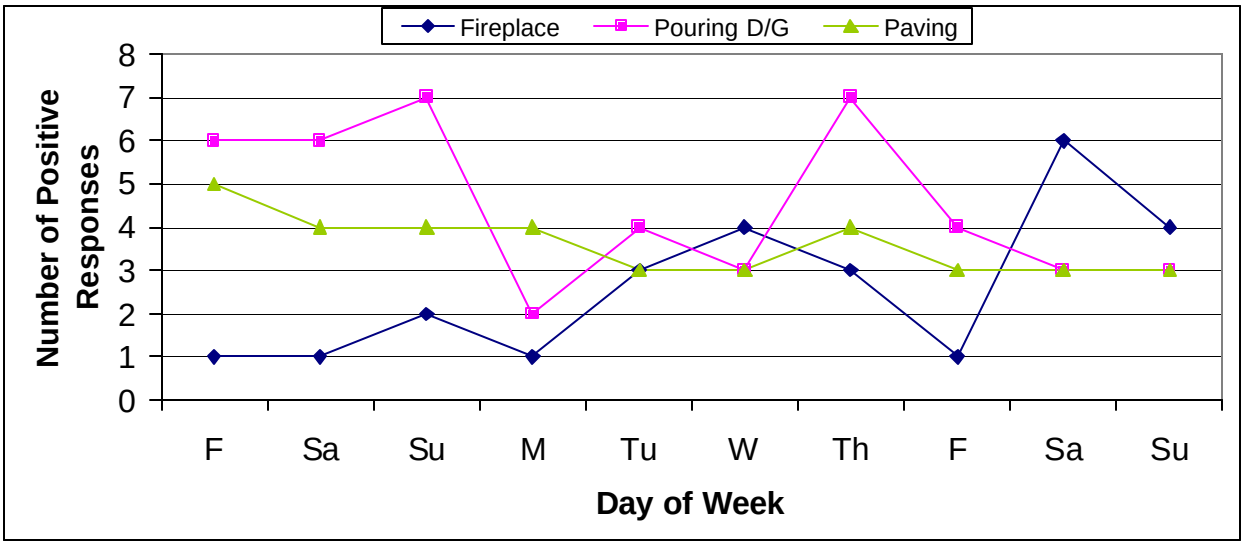


Figure E-3. Number of Respondents reported to be using fireplaces, paving, or pouring fuels.

Table E-21 provides an overall summary of respondents to the residential surveys.

The data show that

- Paving is an activity that 1% of respondents reported being involved with each day. This percentage seems unusually high, as it equates to every household having two or more days of paving activity a year (365-days). For comparison, a roof that needed attending to once every five years would equate to a daily rate of activity of 0.05%, or a rate of activity twenty times less often than that reported by the residences responding.
- While mechanics replace motor oils, gear oils or fluids, or brake fluids routinely, the 3% oil use percentage for households seems high as it equates to each household involved with engine oil 11 days a year. For comparison, a vehicle that underwent an oil change at a residence every ninety days would result in an activity rate of 1%, or 3 times less often that that reported by residences responding.
- The 4% paint usage rate also seems rather high, as it equates to every household applying paint 14 days a year, or roughly, one day a month.
- We also did not expect fireplaces to be used ten times more often in the morning (46%) than in the evening (4%).

On the other hand, we note that

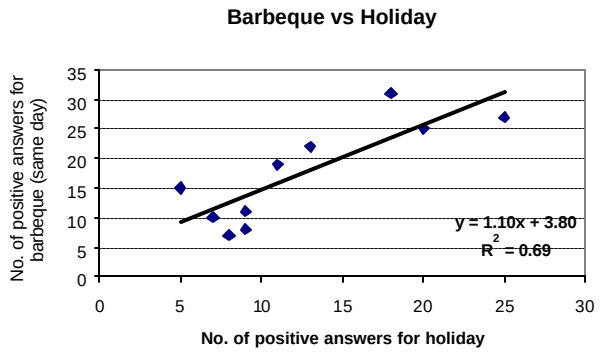
- The 7% usage rate of gasoline-powered yard equipment equates to every household operating lawn and garden equipment at a rate of once every two weeks. This rate of activity falls within what seems reasonable (i.e., mowing the lawn every other week).
- The 3% pesticide/fertilizer usage rate equates to an application rate of eleven days a year, or almost once a month. This rate of activity seems reasonable, as gardens/lawns are likely to be fertilized regularly.

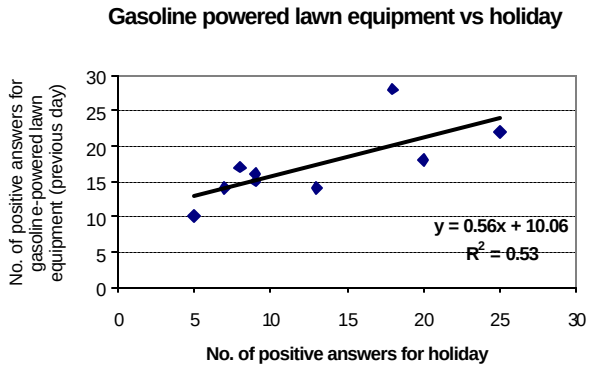
Table E-21. Overall residential response by activity.

ACTIVITY	% OF AFFIRMATIVE RESPONSES	MORNING	AFTERNOON	EVENING
Barbecue	7%	6%	31%	63%
Consumer Products	32%	70%	14%	16%
Engine oils	3%	40%	40%	19%
Fireplace	1%	42%	21%	38%
Gasoline Powered Equipment	6%	46%	45%	9%
Paint	4%	37%	50%	13%
Paving	0.7%	60%	27%	13%
Pesticide/Fertilizer	3%	45%	24%	31%
Pouring oil/gas	2%	54%	19%	27%
Vehicles depart from household	89%	45%	31%	24%

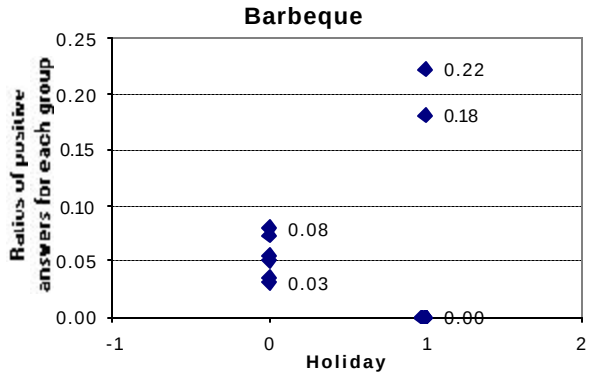
Rain and Holidays

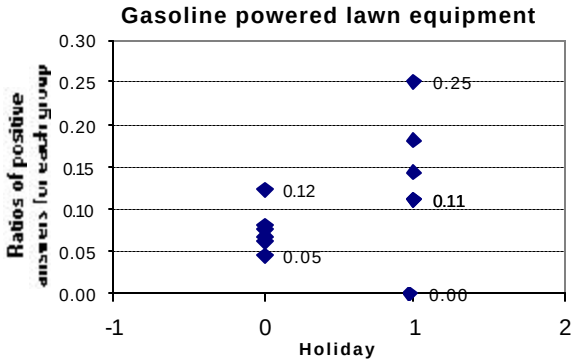
Holidays are positively correlated with lawn/garden equipment usage and barbecue usage. Rain is negatively correlated with barbecue usage. Otherwise, no clear patterns were apparent. With a high degree of confidence ($p \leq 0.05$), it was shown that barbecues are less likely to be used during rainy periods than not. Lawn/garden equipment were more likely to be used on holidays ($p=0.065$). (For the study period, most of the "holiday" responses referred to weekend days.) No clear relationship between rain and lawn/garden equipment usage was observed. Weak correlations were shown for (a) barbecue usage rates vs. holiday response rates, as well as (b) lawn/garden equipment usage for days preceding holidays.





When weekday holidays were considered alone, the number of responses for the weekday-only holiday group makes firm conclusions difficult. However, relationships seem to persist. The ratios of positive responses to total responses were calculated for each group (holiday=1 vs. non-holiday=0) and each weekday (M-F). The ratios for Group 1 tend to be higher than those for Group 0.





No clear patterns emerged for fireplace usage vs. holidays or vs. rain.